PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Yakima River Subbasin Assessment

BPA project number: 20117
Contract renewal date (mm/yyyy): ☐ **Multiple actions?**

Business name of agency, institution or organization requesting funding
Yakama Indian Nation

Business acronym (if appropriate) YIN

Proposal contact person or principal investigator:

Name	Lynn Hatcher, Fisheries Program Manager
Mailing Address	P.O. Box 151
City, ST Zip	Toppenish, WA 98948
Phone	509) 865-6262
Fax	509) 865-6293
Email address	

NPPC Program Measure Number(s) which this project addresses
7.6A.1, 7.6A.2, 7.6B.3, 7.6B.4, 7.6C

FWS/NMFS Biological Opinion Number(s) which this project addresses

Other planning document references
Wy-Kan-Ush-Me-Wa-Kish-Wit, Yakima River Subbasin Plan, basinwide recommendations

Short description
Compile and evaluate existing fisheries and watershed information and perform field verification to prioritize protection, restoration and analysis needs throughout the Yakima River Subbasin, based on potential benefit to the fisheries resources.

Target species
Yakima River chinook, coho, steelhead

Section 2. Sorting and evaluation

Subbasin
Yakima

Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type
Mark one or more	If your project fits either of these	Mark one or more categories

caucus	processes, mark one or both	
☒ Anadromous fish ☐ Resident fish ☐ Wildlife	☐ Multi-year (milestone-based evaluation) ☒ Watershed project evaluation	☐ Watershed councils/model watersheds ☒ Information dissemination ☐ Operation & maintenance ☐ New construction ☐ Research & monitoring ☐ Implementation & management ☐ Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description
20547	Yakima Subbasin Habitat/Watershed Project Umbrella
9603501	Satus Watershed Restoration
926200	Yakama Nation Riparian/Wetlands Restoration Project
9803300	Restore Upper Toppenish Creek Watershed
9705300	Toppenish-Simcoe Instream Flow Restoration
9705100	Yakima Basin Side Channels
9705000	Little Naches Riparian and In-Channel Restoration
9803400	Reestablish Safe Access Into Tributaries of the Yakima Subbasin
9901300	Ahtanum Creek Watershed Assessment

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
20510	Yakima/Klickitat Fisheries Project Umbrella	Dependence of supplementation on habitat carrying capacity

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Compile, evaluate, and ground-truth existing information on historical and current watershed condition and anadromous fish use within the Yakima River Subbasin.	a	Describe historical (i.e. normative) and current watershed condition and function,

		b	Describe historical and current anadromous fish usage within the watershed.
		c	Identify key habitat for protection or restoration, and key locations for reestablishing passage.
		d	Identify limiting factors where anadromous fish populations are depressed,
2	Compile and evaluate information on social and economic factors affecting anadromous fisheries restoration in the Yakima River Subbasin.	e	Survey land ownership, land use, and water use within the watershed,
		f	Survey existing, ongoing, and planned watershed and fisheries studies within the watershed,
3	Perform ground-truthing of factors limiting fisheries resources, and riparian PFC assessment to identify condition, trend, and causes of degradation in key watershed sub-units,	g	Ground-truth findings on limiting factors identified above. Assess riparian/stream condition, trends and causes of degradation in key watershed sub-units.
4	Integrate information, identifying and prioritizing: 1) watershed sub-units, based on potential for protection or restoration of high quality anadromous fish habitat, and 2) information gaps, where potential is indeterminate.		.
5	Prepare a concise report on the results of the assessment.		

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	6/2000	7/2000			.35
2	5/2000	7/2000			.20
3	7/2000	8/2000			.20
4	8/2000	9/2000			.15
5	9/2000	9/2000			.10
				Total	100.00%

Schedule constraints
Weather conditions will affect the timing of field studies; the initiation of the assessment is timed accordingly.

Completion date
9/2000

Section 5. Budget

FY99 project budget (BPA obligated):

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel	Project Manager, 640 hours, Bookkeeper, 80 hours	%7	15,311
Fringe benefits	@ 25.3%	%2	3,874
Supplies, materials, non-expendable property	Miscellaneous supplies	%1	2,000
Operations & maintenance	vehicles, fuel, repairs, insurance	%4	8,900
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		%0	
NEPA costs		%0	
Construction-related support		%0	
PIT tags	# of tags:	%0	
Travel		%0	
Indirect costs	@ 23.5%	%3	7,070
Subcontractor	Professional services (watershed and GIS specialists, fisheries biologist, geographer)	%84	197,904
Other		%0	
		TOTAL BPA FY2000 BUDGET REQUEST	$235,059

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount ($)
		%0	
		%0	
		%0	
		%0	
		Total project cost (including BPA portion)	$235,059

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget				

Section 6. References

Watershed?	Reference
☐	U.S. Department of Interior, Bureau of Reclamation, 1998, Draft Programmatic Environmental Impact Statement for the Yakima River Basin Water Enhancement Project, Washington 194 p. plus appendices.
☐	Kinnison, H. B. and Sceva, J.E., 1963, Effects of Hydrologic and Geologic Factors on Streamflow of the Yakima River Basin, Washington: U.S. Geological Survey Water Supply Paper 1595.
☐	Parker, G.L. and Storey, F.B., 1916, Water Powers of the Cascade Range Part III, Yakima River Basin, U.S. Geological Survey Water Supply Paper 369, 169 pp.
☐	Independent Scientific Group, 1996, Return to theRiver, Restorationof Salmonid Fishes in theColumbia River Ecosystem…584p.

PART II - NARRATIVE

Section 7. Abstract

The Yakima River sub-basin, once perhaps the most productive anadromous fishery of the Columbia River Basin - beset by regulation, diversion, urban development, and various habitat-degrading land uses - now produces a small fraction of its former fish runs. There have been many efforts undertaken to understand and address problems causing the decline of fish runs. A substantial body of information now exists on the nature of these problems, and possible solutions.

In accordance with the NPPC's intention to coordinate fisheries restoration efforts within subbasins, and consistent with their Fish and Wildlife Program, we propose to perform an assessment of the Yakima River Subbasin, with the goal of providing a framework for future fisheries restoration activities. We will: compile existing information on past and present watershed functioning and fisheries resources, and on land and water use; divide the subbasin into groundwater zones; subdivide the groundwater zones by climate/vegetation factors into subbasin units; identify watershed units with high existing or anadromous fishery potential; identify factors limiting fish production. Following field verification, we will synthesize the information to prioritize protection and restoration of habitat, reestablishment of passage, and further analysis needs. A report summarizing the assessment results will be completed in September, 2000.

Section 8. Project description

a. Technical and/or scientific background

Although an integrated watershed assessment of the Yakima River Subbasin has not been done per se, the geology, geomorphology, hydrology, and ecology have been studied for decades by a number of researchers. This previous work has formed the basis for projects performed over the last couple of decades and continuing to the present on fish passage and screening, flow enhancement, and habitat restoration in the basin.

An understanding of the watershed function of the Yakima River Subbasin requires understanding a few key components of the basin's pre-development hydrology and geomorphology including: runoff patterns dominated by spring and early summer melting of the basin's copious snowpack; flow moderation by natural lake storage; and flow and temperature moderation by shallow surface water groundwater interactions in the basin's extensive alluvial floodplain system. Post-development alterations include exclusion of migrating fish from miles of habitat, alteration of runoff patterns by forest practices and road building, impairment of flood plain function by construction of impediments and flow alteration, and truncation and inversion of the basin's hydrograph by storage and diversion of water for irrigation. Existing knowledge of these large scale patterns and features and their influence on river ecology will help focus the work undertaken under this proposal.

Streamflow in the Yakima River Subbasin is mostly generated by the melting of a copious snowpack that accumulates from fall through spring in the Cascade Range. Precipitation falls off dramatically as one moves east from the Cascade crest into the rain shadow, and much of the basin area generates little or no runoff except during low frequency rain or rain on snow events. Summer is dry in the basin, so most of the water budget of the basin is delivered to the mountains during the winter months. The Cascades accumulate the largest snow-water content in the continental United States, which along with the relatively mild climate causes natural peak runoff to be sustained into the summer months. Remnant glaciers in two tributaries (Cle Elum and Tieton) generate some meltwater throughout the summer. Delivery of this runoff to the river system has been affected by road building and forest practices which have generally caused higher, earlier peak flows and lower summer flows. Where appropriate, the effects of these activities will be assessed in this project.

Two major influences moderated streamflow in the lowland reaches of the Yakima River. Natural lake storage and ground storage accounted for much of the flow in the river system during the typical late summer period of little precipitation or snow melt. Several large and many small natural lakes remained at the time of development of the basin as a legacy of the history of ice-age glaciation in the Upper main stem and Naches arms of the Yakima River system. During late summer, outflow typically exceeded inflow and contributed to the base flow of the river. Sockeye inhabited several of these lakes. Four of the five major irrigation storage reservoirs in the basin were built by placing dams atop morainal plugs to increase the size of the lakes and allow outlet works to be constructed. Fish passage was not included in any of the dams, and sockeye are now extinct in the basin. The dams blocked anadromous fish access to a vast amount of habitat in the basin and dampened the effects of upstream watershed modifications on downstream habitat. Until such time as fish passage can be restored, assessing conditions above the dam will not likely provide much benefit and will not be emphasized in this project.

Folding of the basaltic lava flow underlying the lower Yakima Valley created large structural basins separated by ridges. Glaciation in the upper watershed along with erosion on the ridges delivered a large volume of gravel to the river system creating a system of alluvial floodplains stretching from the mountains to the mouth of the river that is probably the most extensive alluvial floodplain system in the interior Columbia River Basin. This flood plain system is segmented into discrete reaches separated by ridges, with the Yakima River flowing from one sub-basin to another through short water gaps in the ridges. Such alluvial floodplain reaches are central to the ecology of gravel bed river systems. Hydrologically, a properly functioning floodplain aquifer system captures peak flows and releases base flows thus acting “as a flywheel on an engine” (Kinnison and Sceva,1963) sustaining stream flows through times of low precipitation and runoff. This floodplain interaction helped maintain high base flows in the lower Yakima River, with late summer flow rarely dropping much below 1000 cfs at Union Gap (Parker and Storey, 1915).

The surface water/groundwater interaction in these reaches also moderated water quality, especially temperature, by capturing cold freshet flows and discharging them through the summer as cooling baseflows, as well as preventing icing in winter.

The role of alluvial floodplain reaches as the centers of biophysical organization and productivity is documented in Return to the River (Independent Scientific Group, 1996) and elsewhere. The extent of such reaches in the Yakima River combined with the substantial water budget accounted for the enormous productivity of the anadromous fish runs in Yakima River Subbasin. All major floodplain reaches in the basin have been modified by physical structures such as highways, railroads, dikes, drainage, and impermeable surfaces, as well as by flow modification and water quality degradation both in the river and in the associated groundwater system. In addition, most of the abundant side channels that characterized these reaches are subjected to dewatering or physical barriers to fish passage. Assessing opportunities to restore, protect, rewater and reconnect these critical off-channel habitats will be a major focus of this project.

Major modifications to the flow regime of the Yakima River Subbasin have accompanied the development irrigation in the basin (YRBWEP Programmatic Environmental Impact Statement). The spring freshet is greatly depressed in most of the basin. In the upper Yakima, where most of the storage capacity is located, the spring freshet has been largely eliminated, but low spring and early summer flows give way to anomalously high flows as the river is used to “wheel” irrigation water to downstream users. The Naches arm contains two main tributaries, the Naches and Tieton Rivers. The Tieton is entirely regulated by a dam and has a typical southern hemisphere hydrograph with no spring freshet and an annual peak in September. The upper Naches generates the largest unregulated runoff in the basin and is accessible to anadromous fish. Assessment of watershed conditions here is warranted. The lower Yakima River (below Sunnyside Dam) is a hybrid of these upstream hydrographs. Flows here are always below natural levels, the freshet is depressed (most of what remains in generated by the Naches River), and low flows begin early and maintain levels of less that about one third of natural runoff. Flows in several areas of the basin fluctuate more rapidly and frequently than pre-development conditions. Assessing the effects of flow modifications and fluctuations is a major focus of ongoing work in the basin.

b. Rationale and significance to Regional Programs

As alluded to above, there is a wealth of information on the fisheries and water resources of the Yakima River Subbasin. There is also a slew of competing and cooperating interests, from federal, tribal, state, county, and municipal governments to irrigation districts, businesses, environmental organizations and individuals, involved in the use, management and restoration of those resources. The need for a coordinated effort to restore healthy anadromous fish runs to the Yakima River Subbasin becomes ever more pressing. The Independent Scientific Review Panel (ISRP) has repeatedly stressed the importance of assessments which will identify and prioritize analysis and restoration needs within the subbasins of the Columbia River Basin. The purpose of this proposal is to address that need within the Yakima River Subbasin .

In the interest of efficiency and efficacy, we must capitalize on our existing knowledge base which has already identified a suite of 'no-brainer, must-fix' problems. The approach outlined in this proposal is based on the idea that a relatively rapid, qualitative assessment of the Yakima River Subbasin, relying largely on existing information, can legitimately perform geographical 'triage', identifying: 1) areas of highest priority for protection, restoration, or reestablishment of passage, 2) areas with indeterminate potential for production of anadromous fish, or with an indeterminate contribution to the functioning of the aquatic ecosystem, where more detailed, smaller-scale watershed analysis is appropriate, and 3) areas where, for physical/biological or social/economic reasons, the potential for anadromous fish production is low, or the influence on the aquatic ecosystem is small. These determinations will be made in accordance with the Columbia River Fish and Wildlife Program measures 7.6B.3 and 7.6B.4, which state: *'…Give priority to habitat projects that have been integrated into broader watershed improvement efforts and that promote cooperative agreements with private landowner.'*, and *'For actions that increase habitat productivity or quantity, give priority to actions that maximize the desired result per dollar spent. Also, give higher priority to actions that have a high probability of succeeding at a reasonable cost over those that have great cost and highly uncertain success.'*

This assessment will provide guidance for immediate to mid-term restoration efforts in the Yakima River Subbasin, as well as identifying information gaps which should be filled.

c. Relationships to other projects

This project will build on the information base generated by numerous other projects (e.g. Yakima/Klickitat Fisheries Project, Yakima River Basin Water Enhancement Project, NWPPC Yakima Subbasin Plan). The results of this project will guide future fish restoration proposals submitted for the Yakima Subbasin by the YIN.

d. Project history (for ongoing projects)

not applicable

e. Proposal objectives

The objectives of this proposal are to:
1. Compile and evaluate existing information on historical and current watershed condition and anadromous fish use within the Yakima River Subbasin,
2. compile and evaluate information on land use, land ownership, water use, and future development with the Yakima River Subbasin,
3. perform ground-truthing of factors limiting fisheries resources, and riparian PFC assessment to identify condition, trend, and causes of degradation in key watershed sub-units,

4. integrate information, identifying and prioritizing: a) watershed sub-units, based on potential for protection or restoration of high quality anadromous fish habitat, and b) information gaps, where potential is indeterminate, and
5. prepare a concise report detailing the results of the assessment.

f. Methods

The various tasks will be divided into three inter-related subsets: watershed, fisheries, and social/economic. A team of three to five individuals, collectively having expertise in geology, geomorphology, hydrology, plant ecology, and soil science, will be assembled to assess watershed condition and functioning. A fisheries biologist will develop the fisheries component of the assessment. The individual responsible for the social/economic component need not have a specific expertise, but should be thoroughly familiar with water and fisheries resources issues in the Yakima River Subbasin. Additionally, a Geographic Information Systems (GIS) specialist will assist in the analysis and synthesis of the information collected by the members of the assessment team. To the greatest degree possible, everyone involved should have experience in the Yakima River Subbasin which supports their understanding of the physical, biological, social, and economic processes within the subbasin.

The scale of investigation will be based on division of the subbasin into twenty-five groundwater zones as delineated by Kinnison and Sceva (1963). Preliminary assessment resources will include: existing studies, existing GIS information, topographic, geologic, soils and vegetation maps, aerial photographs, flow records, climate records, historical land use records, local resource professionals, land managers, and land users. GIS coverages will be developed as needed to support the characterization of the watershed and the fisheries resources. Interaction, communication, and the sharing of information among the assessors will be critical to the development of this assessment

The watershed assessment team will further subdivide the groundwater zones into subbasin units based on the factors (i.e., climate, vegetation, and geomorphology) which drive the hydrologic functioning of these areas.

A fisheries biologist will identify areas throughout the subbasin with high existing or potential value to the fisheries resource, and summarize existing knowledge of factors limiting habitat or passage for each area with impaired fisheries value. We will incorporate the substantial effort in progress under the Yakima/Klickitat Fisheries Project to model the current performance of salmon and steelhead stocks in the Yakima Subbasin as a function of quality, quantity and connectivity of their habitat. The modeling project in turn has incorporated data gathered by a number of agencies on the physical and biological parameters affecting these stocks at specific locations and time periods.

The social/economic specialist will: compile existing watershed analyses, studies on fisheries and water resources, and identify ongoing or planned analyses and studies; summarize existing legislation pertaining to fisheries restoration; inventory ongoing and planned restoration projects; locate or develop maps of land ownership, land use, and water use within the watershed.

With the onset of the field season, the watershed team will conduct Proper Functioning Condition (PFC) assessment on the areas with depressed anadromous fish production. PFC assessment is a rapid, qualitative technique developed and adopted by the USDA Forest Service and the USDI Bureau of Land Management for evaluating the functional condition and trend of stream/riparian systems. Condition, trend, causes of degradation (i.e., site-specific, and/or cumulative effects), and potential for restoration will be assessed. Concurrently, the fisheries biologist will perform field studies to ground-truth his investigations into factors limiting fisheries productivity. Collectively, these efforts will confirm the locations of: 1) sites having a high priority for protection restoration, or passage improvement and the

nature of both the problems and solutions, and 2) sites having a high priority for further assessment, and the nature of the information needs. In addition to ground-truthing existing knowledge and prioritizing restoration and analysis efforts, these assessments will establish a record of the current condition of an array of locations critical for fisheries habitat.

Finally, the watershed assessment team, the fisheries biologist, and the social/economic factors investigator will combine and synthesize their findings to group the subbasin units according to actual or potential fisheries significance. The subbasin units will be assigned to one of three groups, based on having: 1) high existing or potential fisheries value, with high priority for protection, habitat restoration, or reestablishment of passage; 2) an indeterminate level of potential fisheries value i.e., a more detailed analysis is appropriate, or 3) low potential fisheries value. The assessment team will summarize their findings and recommendations in a report.

g. Facilities and equipment

There are no capital purchases in this proposal. Staff and contractors will have suitable facilities and equipment.

h. Budget

Yakama Indian Nation staff will be responsible for project oversight and administration. These functions will require 640 hours of professional staff time and 80 hours of a bookkeeper's time. Personnel costs, including fringe benefits will amount to $19, 185. Miscellaneous supplies, vehicle costs and indirect costs will add another 17,970.

The majority of the budget (i.e., $197,904) will be allocated to contracting the professional services of the watershed specialist, fisheries biologist, and GIS specialist for the period of the assessment. This amount includes lodging expenses which will be incurred during field investigations.

Section 9. Key personnel

GINA RINGER

509) 865-6262, ext. 6647 (W) email: gringer@yakama.com

Education:

M.S., Forest Hydrology, 1994
minor in ecology
Oregon State University

B.S., Civil Engineering, 1979
B.S., Agricultural Engineering,
University of California at Davis

Experience:

Watershed Hydrologist July 1996 - present
Yakama Indian Nation Satus Watershed Project, Toppenish, Washington
Develop and manage the Satus Watershed Project, implementing grants to perform watershed analysis and restoration; designing and supervising the installation of an extensive monitoring network; analyzing streamflow and climate records; planning and supervising the implementation of watershed restoration treatments; interdisciplinary assessment of riparian and upland areas; interdisciplinary watershed analysis and report preparation; hiring personnel; supervising; preparation and administration of contracts; preparation and delivery of presentations; preparation of funding proposals.

Hydrologist October 1994 - July 1996
Yakama Indian Nation Water Program, Wapato, Washington
Evaluate the effects of land use on the surface waters of the Yakama Reservation; advise staff and policy makers; make recommendations on issues involving surface waters; collect and analyze

hydrologic data; hydrologic modeling; technical support; interdisciplinary planning of timber sales.

Hydrologist/Civil Engineer May 1994 - September 1994
Washington Department of Fish and Wildlife, Engineering and Technical Support Section of the Habitat Division, Olympia, Washington.
Hydrologic and hydraulic analysis of natural channels; interdisciplinary development of aquatic habitat restoration and flood risk management plans for the Dungeness and Quilcene rivers; verification and improvement of a model specifying design flows for fish passage.

Publications:

Adams, P.W. and G.O. Ringer. 1994. Summary and annotated bibliography of the effects of timber harvesting and forest roads on water quantity and quality in the Pacific Northwest. Oregon Forest Resources Institute.

Awards:

OSU College of Forestry Fellowship.
California State Scholarship**.**

Licenses and Professional Credentials:

Professional Engineer, California, license no. C35359.
Member, Washington State Riparian Proper Functioning Condition (PFC) training cadre.

Section 10. Information/technology transfer

Although beyond the scope of this proposal, we believe that the information compiled and generated by this assessment should be archived in way that it is accessible to all interested parties. To the best of our knowledge, STREAMNET would be the logical choice to provide this service.

Congratulations!